Precalc Chapter 3 Review Name _____

1. The half-life of a substance is 4 minutes. The original mass is 100 grams. How much of the substance remains after 15 minutes?

$A(t)=A_0\left(\frac{1}{2}\right)^{t/\text{Half-Life}}$

$A=100\left(\frac{1}{2}\right)^{\frac{15}{4}}=$ 7.43 grams

2. Write a logistic function if:

Initial value = 10, Limit to growth = 50, Passes through (2,30)

$C=50$

not a! (0,10)

① $10=\frac{50}{1+a\cdot b^0}$

$10=\frac{50}{1+a}$

$10+10a=50$

$a=4$

② $30=\frac{50}{1+4b^2}$

$30+120b^2=50$

$120b^2=20$

$b^2=\frac{1}{6}$

$b\approx .41$

③ $f(x)=\frac{50}{1+4(.41)^x}$

Solve for x:

3. $\log(x+1)-\log(2x-1)=\frac{1}{2}\log 4$

$\log\frac{x+1}{2x-1}=\log 2$

$4^{\frac{1}{2}}=\sqrt{4}=2$

$x+1=4x-2$

$3=3x$

$x=1$

4. $\log_4(x-3)=-1$

$4^{-1}=x-3$

$\frac{1}{4}=x-3$

$x=3\frac{1}{4}$

5. $1+2e^{-2x}=6$

$2e^{-2x}=5$

$e^{-2x}=\frac{5}{2}$

$\ln\frac{5}{2}=-2x$

$x=-.458$

6. $\left(\frac{1}{4}\right)^{4x-1}=8^{3x}$

$2^{-2(4x-1)}=2^{3(3x)}$

$-8x+2=9x$

$2=17x$

$\frac{2}{17}=x$

7. Write the equation of an exponential function that goes through (0,2) and (3,12). (Round b-value to nearest hundredths.)

$a=2$ (x, y)

$y=a\cdot b^x$

$12=2\cdot b^3$

$6=b^3$

$b\approx 1.82$

$y=2(1.82)^x$

8. The population of Chicago has been increasing at 1.2% per year. If the population is 3,000,000 in 2000, ~~when will the population reach~~ 3,500,000?

$r=.012$

$P(t)=P_0(1\pm r)^t$

$3{,}500{,}000=3{,}000{,}000(1.012)^t$

$\frac{7}{6}=1.012^t$

$\log_{1.012}\frac{7}{6}=t\approx$ 12.923 years